WE CLAIM:

1. A nanotechnological structure for a scanning probe microscope, comprising a tip member, upstanding from a support member, and a nanowhisker grown on and projecting from a free end of the tip member.

2. A structure according to claim 1, wherein the support member comprises a flexible member of predetermined dimensions and mechanical characteristics, the upstanding tip member being located at or adjacent a free end of the flexible member.

3. A structure according to claim 2, wherein the flexible member comprises an elongate beam.

4. A structure according to claim 1, wherein the nanowhisker comprises doped large band gap semiconductor material, to provide in use a narrow energy distribution of electrons flowing therethrough.

5. A structure according to claim 1, wherein the nanowhisker comprises a resonant tunnelling diode structure including a sequence of segments of semiconductor material of different band gaps.

6. A structure according to claim 1, wherein the nanowhisker comprises a light emitting diode structure including a sequence of segments of semiconductor material of different band gaps.

7. A structure according to claim 1, wherein a coaxial layer of material that is inert to biological material is provided along a length of the nanowhisker.

8. A structure according to claim 7, wherein the nanowhisker is formed of silicon, and the coaxial layer is silicon dioxide.

9. A structure according to claim 1, wherein the nanowhisker is formed of a magnetic material or semimagnetic material and capable of providing a stream of spin-polarised electrons.

10. A structure according to claim 9, wherein the nanowhisker comprises one of: MnInAs or MnGaAs or MnAs.

11. A structure according to claim 9 , wherein the nanowhisker has only a single ferromagnetic domain.

12. A structure according to claim 2, wherein the flexible member is formed of a magnetic material.

13. A nanotechnological structure, comprising a flexible support member, the support member having an upstanding tip member formed at or adjacent a free end of the support member, and a nanowhisker grown on a free end of the tip member.

14. A structure according to claim 13, wherein the flexible support member comprises an elongate beam.

15. A structure according to claim 13, wherein the nanowhisker comprises doped large band gap semiconductor material, to provide in use a narrow energy distribution of electrons flowing therethrough.

16. A structure according to claim 13, wherein the nanowhisker comprises a resonant tunnelling diode structure including a sequence of segments of semiconductor material of different band gaps.

17. A structure according to claim 13, wherein the nanowhisker comprises a light emitting diode structure including a sequence of segments of semiconductor material of different band gaps.

18. A structure according to claim 13, wherein a coaxial layer of material that is inert to biological material is provided along a length of the nanowhisker.

19. A structure according to claim 18, wherein the nanowhisker is formed of silicon, and the coaxial layer is silicon dioxide.

20. A structure according to claim 13, wherein the nanowhisker is formed of a magnetic material or semimagnetic material and capable of providing a stream of spin-polarised electrons.

21. A structure according to claim 20, wherein the nanowhisker comprises one of: MnAs or MnInAs or MnGaAs.

22. A structure according to claim 20, wherein the nanowhisker has only a single ferromagnetic domain.

23. A structure according to claim 13, wherein the support member is formed of a magnetic material.

24. A method of forming a nanotechnological structure for a scanning probe microscope, comprising:

providing a tip member;

providing at a free end of the tip member a mass of catalytic material ; and

heating the mass and exposing the mass to gases of predetermined type under conditions such as to form, by a VLS process, a nanowhisker upstanding from the tip member.

25. A method according to claim 24, wherein the mass of catalytic material includes material provided on the tip member free end by an electrolytic process.

26. A method according to claim 24, wherein the mass of catalytic material includes material provided on the tip member free end by depositing an aerosol particle thereon.

27. A method according to claim 24, wherein the nanowhisker is formed of doped large band gap semiconductor material, to provide in use a narrow energy distribution of electrons flowing therethrough.

28. A method according to claim 24, wherein the nanowhisker is formed to include a resonant tunnelling diode structure having a sequence of segments of semiconductor material of different band gaps.

29. A method according to claim 24, wherein the nanowhisker is formed to include a light emitting diode structure having a sequence of segments of semiconductor material of different band gaps.

30. A method according to claim 24, wherein the nanowhisker is formed of a magnetic material or semimagnetic material and capable of providing a stream of spin-polarised electrons.

31. A method according to claim 30, wherein the nanowhisker comprises one of: MnAs, MnInAs or MnGaAs.

32. A method according to claim 30, wherein the nanowhisker has only a single ferromagnetic domain.

33. A method according to claim 24, wherein the tip member is mounted on a flexible support member of predetermined dimensions and wherein the flexible support member is formed of a magnetic material.

34. A method according to claim 24, wherein the catalytic material is of a same material as the nanowhisker.

35. A method according to claim 24, wherein the nanowhisker is formed of an oxidisable material, and the method further comprises exposing the nanowhisker to an oxidising environment so as to form a coaxial oxide layer along a length of the nanowhisker.

36. A method according to claim 24, further comprising:

terminating growth of the nanowhisker by changing at least one operating condition to provide at the end of the nanowhisker a segment of a different material from that of an adjacent portion of the nanowhisker; and

selectively etching the different material so as to remove the different material and the catalytic material from the nanowhisker.

37. A method of forming a nanotechnological structure, comprising:

providing an upstanding tip member at or near a free end of a flexible support member of predetermined dimensions and mechanical characteristics;

providing at a free end of the tip member a mass of catalytic material; and

heating the mass and exposing the mass to gases of predetermined type under conditions such as to form, by a VLS process, a nanowhisker upstanding from the tip member.

38. A method according to claim 37, wherein the support member comprises an elongate beam.

39. A method according to claim 38, wherein the mass of catalytic material includes material provided on the tip member free end by an electrolytic process or by deposition of an aerosol particle.

40. A method according to claim 37, wherein the nanowhisker is formed of doped large band gap semiconductor material, to provide in use a narrow energy distribution of electrons flowing therethrough.

41. A method according to claim 37, wherein the nanowhisker is formed to include a resonant tunnelling diode structure having a sequence of segments of semiconductor material of different band gaps.

42. A method according to claim 37, wherein the nanowhisker is formed to include a light emitting diode structure having a sequence of segments of semiconductor material of different band gaps.

43. A method according to claim 37, wherein the nanowhisker is formed of a magnetic material or semimagnetic material and capable of providing a stream of spin-polarised electrons.

44. A method according to claim 43, wherein the nanowhisker comprises one of: MnAs or MnInAs or MnGaAs.

45. A method according to claim 43, wherein the nanowhisker has only a single ferromagnetic domain.

46. A method according to claim 37, wherein the support member is formed of a magnetic material.

47. A method according to claim 37, wherein the catalytic material is of a same material as the nanowhisker.

48. A method according to claim 37, wherein the nanowhisker is formed of an oxidisable material, and the method further comprises exposing the nanowhisker to an oxidizing environment so as to form a coaxial oxide layer along a length of the nanowhisker.

49. A method according to claim 37, further comprising:

terminating growth of the nanowhisker by changing at least one operating condition to provide at an end of the nanowhisker a segment of a different material from that of an adjacent portion of the nanowhisker; and

selectively etching the different material so as to remove the different material and the catalytic material from the nanowhisker.

50. A process of forming a nanowhisker, comprising:

providing a mass of catalytic material, and exposing the mass to one or more gases under predetermined operating conditions to form, by a VLS process, a nanowhisker;

terminating a growth of the nanowhisker by changing at least one operating condition to provide at an end of the nanowhisker a segment of a different material from that of an adjacent portion of the nanowhisker; and,

selectively etching the different material so as to remove the different material and the catalytic material from the nanowhisker.

51. A process according to claim 50, wherein the end of the nanowhisker is etched to produce a sharply rounded or pointed end.

52. A nanowhisker formed of magnetic material, wherein only a single ferromagnetic domain exists within the nanowhisker, and a diameter of the nanowhisker is less than about 25 nm.

53. A data storage medium comprising nanowhiskers formed on a substrate, each nanowhisker being formed of magnetic or semimagnetic material, and read/write structure operative to selectively energise each nanowhisker in either of two magnetised directions and to sense the magnetised direction of each nanowhisker.

54. A data storage medium according to claim 53, wherein each nanowhisker has only a single ferromagnetic domain.

55. A data storage medium according to claim 53, wherein each nanowhisker has a diameter not greater than about 25nm.

56. A data storage medium according to claim 53, wherein said read/write structure comprises at least one head movable over the nanowhiskers and selectively positionable over each nanowhisker to inject a current of spin-polarised electrons therein.

57. A data storage medium according to claim 56, wherein said head is a read/write head, and wherein in a writing mode, said head is operable to inject a sufficiently strong current of spin polarised electrons into the selected nanowhisker for forcing a desired direction of magnetisation into the nanowhisker.

58. A data storage medium according to claim 56, wherein said head comprises a nanotechnological structure including a tip member of conductive or semiconductive material, and a nanowhisker projecting from an end of the tip member, and being integral therewith.

59. A data storage medium according to claim 58, wherein said tip member is disposed on a flexible support member.

60. A data storage medium according to claim 59, wherein one of the flexible support member and nanowhisker comprises a magnetic or semimagnetic material capable of providing a stream of spin polarised electrons.

61. A data storage medium according to claim 53, wherein each nanowhisker is spaced from each of its nearest neighbours by a distance less than twice its diameter.

62. A data storage medium comprising one-dimensional nanoelements formed on a substrate, each nanoelement being formed from magnetic or semi-magnetic material, reading/writing structure for selectively magnetising each nanoelement in either of first and second oppositely magnetised directions, and for sensing the magnetised direction of each nanoelement, the reading/writing structure comprising a head movable over the nanoelements and being selectively positionable over each nanoelement for injecting a current of spin-polarised electrons therein, and the head comprising a nanotechnological structure including a tip member of conductive or semiconductive material, and a nanowhisker projecting from an end of the tip member, and being integral therewith.

63. A method forming a data storage medium, comprising:
forming masses of catalytic material at predetermined sites on a substrate; and growing at each site a nanowhisker of magnetic or semi-magnetic material such that only a single ferromagnetic domain exists within the nanowhisker.

64. The nanowhisker of claim 52 having a diameter not greater than about 25 nm.

65. The nanowhisker of claim 52 having a diameter not greater than about 10 nm.

66. The data storage medium according to claim 53, wherein each nanowhisker has a diameter not greater than about 10 nm.